DOCUMENT RESUME

ED 320 047 CG 022 542

AUTHOR Marcellino, Robert Leonard, Jr.
TITLE Current Clinical Interventions for Smoking Cessation: A Review of Empirical Studies.
PUB DATE Jun 90
NOTE 70p.; Doctoral research paper, Biola University.
PUB TYPE Dissertations/Theses - Doctoral Dissertations (041) -- Information Analyses (070)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Counseling Techniques; *Intervention; *Outcomes of Treatment; *Smoking
IDENTIFIERS *Relapse; *Smoking Cessation

ABSTRACT

This document reviews all empirical studies on clinically-based smoking cessation interventions that were reported in "Psychological Abstracts" between January 1982 and March 1990. Interventions are categorized as either physiological or psychological in orientation and are further grouped according to specific treatment type: acupuncture, anticholinergics, nicotine gum, gradual reduction, restricted environmental stimulation therapy, hypnosis, aversion therapies, contingent reinforcement, and cognitive-behavioral skills training. It is concluded from a review of the results of the studies that abstinence rates one year following treatment generally fall between 20 and 30 percent, although persuasive evidence is presented for the relative superiority of two interventions: nicotine gum in combination with other physiologically-oriented techniques and aversion therapies in combination with other physiologically-oriented techniques. Suggestions for future research are offered. Nine data tables illustrate abstinence rates for various studies and a 10th table compares psychological and physiological interventions across all the studies reviewed. Six pages of references are included. (Author/NB)

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CURRENT CLINICAL INTERVENTIONS FOR SMOKING CESSATION: A REVIEW OF EMPIRICAL STUDIES

A Doctoral Research Paper

Presented to

the Faculty of the Rosemead School of Psychology

Biola University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

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by

Robert Leonard Marcellino, Jr.

June 1990

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A REVIEW OF EMPIRICAL STUDIES

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ABSTRACT

CURRENT CLINICAL INTERVENTIONS FOR SMOKING CESSATION:
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Robert Leonard Marcellino, Jr.

This doctoral paper reviews all empirical studies on clinically-based smoking cessation interventions that were reported in Psychological Abstracts between January 1982 and March 1990. Interventions are categorized as either physiological or psychological in orientation, and are further grouped according to specific treatment type. Results indicate that abstinence rates one year following treatment generally fall between 20% and 30%, although persuasive evidence is presented for the relative superiority of two interventions: nicotine gum in combination with other physiologically-oriented techniques; and aversion therapies in combination with other physiologically-oriented techniques. Suggestions for future research are offered.

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Current Clinical Interventions for Smoking Cessation: A Review of Empirical Studies

Introduction

Cigarette smoking is "responsible for about 375,000 excess or premature deaths each year in the United States," stated former U.S. Surgeon General Julius Richmond (Ross, 1985, p. viii). Although the percentage of Americans who smoke had decreased by one-third in the 20 years preceding his remark, some 53 million U.S. citizens had remained addicted to cigarettes (Ross, 1985). Thousands of smokers attempt to quit cigarettes each year. Some try to accomplish this task on their own, whereas others enlist the assistance of professionals.

There is no shortage of diversity in treatments offered by these professionals, and this state of affairs raises a question of substantial practical import: Which smoking cessation technique is the most effective? To this question the present review is addressed.

That which makes cigarette smoking so difficult to stop is its twofold addictive nature, for it addicts both mind and body. The withholding of nicotine, the principle psychoactive component in cigarettes (Mann, Johnson, & Levine, 1986), from a person who has grown accustomed to its

presence generates painful withdrawal symptoms that are both physiological and psychological in nature (American Psychiatric Association, 1987, pp. 150-151).

Nicotine is particularly addictive due to the manner in which its psychoactive agent is administered. As opposed to many other psychopharmacological agents, which are introduced once or perhaps a few times at a sitting, nicotine "hits" are delivered to the body with every draw. So whereas a cocaine user on a twice-a-day schedule will receive 730 hits annually, a pack-a-day smoker will receive 75,000 hits in one year (American Psychiatric Association, 1987, p. 181).

The psychological effects of cigarette withdrawal include irritability, anxiety, depression, dejection, confusion, and concentration difficulties. Among the common physiological symptoms are increased caloric intake and subsequent weight gain, pronounced craving for tobacco, dizziness, and sleep disturbances (American Psychiatric Association, 1987, pp. 150-151; Bragg & Hughes, 1984; Hatsukami, Hughes, Pickens, & Svikis, 1984).

Yet many smokers desire to quit and not without good reason. Cigarette smoking is strongly associated with coronary heart disease (Bragg & Hughes, 1984). Other common complications associated with prolonged cigarette use are bronchitis, emphysema, peripheral vascular disease, and a variety of cancers (American Psychiatric Association, 1987, p. 182).

This review will divide the treatments found in the literature into two broad categories, physiological interventions and psychological interventions. This flows logically from the distinction between physiological and psychological withdrawal symptoms found in the Diagnostic and Statistical Manual of Mental Disorders (Third Edition--Revised), combined with the assumption that both kinds of withdrawal symptoms impede quitting.

Methodological Issues

Studies in this review were acquired exclusively through a search of the Drug and Alcohol Rehabilitation section of Psychological Abstracts. Empirical studies of interventions reported in abstracts from January 1982 through March 1990 were used. In addition, for this review the treatment goal had to be cessation, not merely reduction in cigarette consumption. Studies with subject pools comprised solely of pregnant persons or those with coronary heart disease were also excluded, as the additional incentives provided by their respective conditions might preclude valid generalization of the results to the population in general. To be reported in this review, a study had to include follow-up cessation data for a minimum of 6 months after the end of the treatment. Research on non-clinical interventions (television programs, radio commercials, "Smoke-Outs," books, programs-by-mail, etc.)

were not included. Studies of maintenance variables and subject variables were beyond the scope of this review.

Three types of measurement of subject smoking behavior were found in the studies. One involved measuring the amount of carbon monoxide (CO) in the breath. Subjects simply expelled a breath of air into a plastic bag, which was then analyzed by a machine such as the Ecolyzer Model 2000 by Energetics Sciences, Inc. This machine reports breath CO in terms of parts per million (ppm). The CO level cut-off point used for defining abstinence varied only slightly across the studies, hovering around 8 ppm.

A second method of assessing the presence of smoking was subject report. This was accomplished via questionnaire, personal interview, or telephone contact. A variant of this technique involved the utilization of an informant, a person familiar with the subject's smoking patterns who could verify reported abstinence or continued smoking.

The third method, much less common than the others, measured the amount of thiocyanate in the blood. Thiocyanate is a form of cyanide that cigarette smoking deposits into the blood stream. Its relatively long biologic half-life of 2 weeks would make it the method of choice in smoking studies, were it not for most subjects' aversion to having their blood drawn. Interestingly, in one recent study (Lando, Kalb, & McGovern, 1988) thiocyanate levels were measured from subjects' saliva. This technique

holds promise for future smoking cessation research, as it is less intrusive than drawing blood.

Due to the accuracy of the physiological measures and to the lack of an incentive for subjects to lie to researchers about their smoking behavior, I consider the results of the studies in this review to be reasonably accurate in regards to abstinence rates. The area of difficulty for these studies is in the meaning of the term abstinence.

Only a few studies provided explicit definitions of abstinence. This is a critical point: when a study reported a subject as "abstinent at 12-month follow-up," precisely what does that mean? Did he not smoke at all from treatment to follow-up? May he have had a few cigarettes, but not too many? How many? What if he had a full relapse shortly after the treatment, but hasn't smoked at all in 10 months? Unfortunately, only nine definitions were provided at all, and not all of these are clear in meaning: (a) not smoking at time of follow-up (Kornitzer, Kittel, Dramaix, & Bordoux, 1987), (b) "long-term cessation" (Glasgow, Klesges, Godding, Vasey, & O'Neill, 1984, p. 137), (c) no smoking since treatment (Lando & McGovern, 1982), (d) no more than two cigarettes in a single day during the first six weeks of treatment, followed by no use at all (Tonnesen et al., 1988), (e) "self-reported abstinence for at least Months 9 through 12 of the 1-year follow-up, with [saliva thiocyanate] verified 12-month abstinence" (Curry, Marlatt,

Gordon, & Baer, 1988, p. 552), (f) not returning to regular smoking at any time between treatment and follow-up (Decker & Evans, 1989), (g) continuous abstinence (Harackiewicz, Blair, Sansone, Epstein, & Stuchell, 1988), (h) continuous abstinence (Neufeld & Lynn, 1988), (i) breath CO less than 8 ppm and a self-report of smoking not more than one cigarette in the past 10 days (Walker & Franzini, 1985). The studies that combined self-report and biochemical measures uniformly reported very small differences in reliability between the two, but this might have been due to the subjects being aware that their reports were to be scientifically tested for validity. Hence generalization is tenuous from those studies in which self-report unaccompanied by physiological measurement was used. "Abstinence" at 6 and 12 months is reported throughout the current report, but by no means can this term be assumed to represent a uniform state of affairs. On a more positive note, reported abstinence rates usually regarded subjects who dropped out as non-abstinent; in instances where they did not, for the sake of uniform comparison their statistics have been recalculated by counting dropouts as smokers.

Subjects for all of the experiments listed in this review consisted of regular, long-term smokers who were seeking to quit. Often the subjects could be termed heavy smokers, with daily cigarette consumption rates of 30 or greater. All subjects were at least 16 years old, and treatment groups usually were characterized by a broad age

range--often reaching into the 60s or 70s. Nurses, factory employees, hospitalized patients and their visitors, and college students occasionally constituted the subject pool; but more typically the subjects were persons seeking treatment at a stop-smoking clinic, a hospital, or a psychologist's office.

Each section of this review will begin with a general orientation to the intervention area to be reviewed. Next, studies involving only that technique will be discussed. Following that will be a subsection on studies that combine that technique with another (if there were any). Each section will end with a summary of the literature in that area. A brief description of each study will be provided.

All the subjects in the studies in this review desired to quit smoking, and many had actively sought out treatment to assist them toward this end. A vital question arises from this circumstance: How many of these subjects would have quit smoking at this point simply due to their desire to quit? An answer comes from the control groups used in some cessation studies. The success rate in these control groups reveals how many subjects would have quit without any inherent effectiveness in the treatment. Table 1 summarizes the success rates in control groups.

The 6-month placebo rate was derived solely from 5 nicotine gum placebo studies, and the 12-month placebo rate was derived from 5 nicotine gum placebo studies plus one placebo treatment that utilized lactose capsules. The 12-

mo. rate of the 5 nicotine gum placebo studies alone was 20%. Since placebo nicotine gum appears to have treatment capabilities far in excess of the other control groups in this review, a more helpful reference point might best be determined by deriving 6-month and 12-month rates of the other groups. Those respective rates are 9% and 10%. (These rates include the one placebo condition that did not involve placebo nicotine gum.)

Table 1

Abstinence Rates of the Control Groups in the Studies Reported in this Review

Description	6 months		12 months	
	rate	n[a]	rate	n[a]
waiting list	0%	30	4%	46
placebo	25%	174	17%	337
attention discussion	17%	35	0%	20

[a]Total number of subjects.

The utility of this information can be conceptualized in this way: if treatment X reports a 12-month success rate of 35%, the treatment can be assumed to have been decisively

instrumental in the success of 25% (35% minus 10%) of the subjects.

Having discussed preliminary issues, described the methodology, and provided an anchoring point for the cessation rates, the treatments themselves will now be reviewed. First will be those classified under the broad category of "physiological interventions." The succeeding major section will examine "psychological interventions" for smoking cessation.

Physiological Interventions

This section will cover four physiologically oriented interventions for smoking cessation: acupuncture, anticholinergics, nicotine gum, and gradual reduction. These treatments are categorized as physiological because they are administered to (or, in the case of gradual reduction, involve a withholding from) the client's body. Distinguishing them from psychological treatments is not an attempt to deny that they also affect clients in a psychological manner; rather, their potential (and probable) psychological effects are derivative from the physiological impact of the intervention.

Acupuncture

The first physiological intervention to be considred in this review is acupuncture. The principle of using acupuncture in smoking cessation is to reduce or eliminate the discomfort of nicotine withdrawal by generating a

sensation of relaxation in key body areas. The acupuncture procedure involves inserting needles into the body at precise locations.

In a study of 558 heavy smokers (mean consumption of 31/day), Cottraux et al. (1983) compared the effects of acupuncture (n = 140) to placebo medication (n = 140) and two other treatments. The acupuncture treatment involved one 20-minute session each week for three weeks; in the placebo condition, lactose capsules were to be self-administered three times per day. At the end of the three-week treatment, significantly more subjects in the acupuncture group had stopped smoking. However, at 12-month follow-up the difference in effectiveness had vanished, with 23 (16%) of the acupuncture subjects abstinent versus 19 (14%) of the placebo subjects.

In Cottraux et al.'s study, the placebo treatment involved capsules--a treatment not at all similar to acupuncture's needle insertions. What of the effectiveness of Cottraux' et al.'s acupuncture condition? Is it truly due to the placebo effect? In order to test this hypothesis, Steiner, Hay and Davis (1982) matched 16 pairs of adults for age, sex, and pretreatment cigarette consumption. They then randomly assigned half to a genuine acupuncture treatment and half to a sham treatment. Results yielded significant reduction in cigarette consumption for both groups, but no significant difference emerged between

the real and sham treatments in terms of effectiveness. Acupuncture did not reduce cigarette smoking in their study.

This research suggests that acupuncture's success rate in curing smoking is small--only about 16%--and the treatment's success can be accounted for by the placebo effect.

Anticholinergics

A class of drugs recently used for smoking cessation is the anticholinergics. The principle of anticholinergics is to reduce the stimulation of the neurological receptors of the withdrawal sensations, thereby diminishing the client's sensitivity to physiological withdrawal symptoms. A few definitions are necessary at this point. Choline is a substance found in the human body. It is a constituent of the vitamin B complex, comprised of carbon, hydrogen, nitrogen, and oxygen. A cholinergic is a substance that is caused to act by choline. Cholinergics inhibit the destruction of acetylcholine that is released from the parasympathetic and somatic efferent nerves. This causes the acetylcholine to accumulate, promoting an increased stimulation of the receptor (McVan, Blake, & DaCunha, 1989, p. 341). Anticholinergics inhibit the action of cholinergics by blocking the central cholinergic receptors. How all this impacts smoking is that the anticholinergics decrease the stimulation of receptors sensitive to withdrawal symptoms (McVan, Blake, & DaCunha, 1989, p. 349).

Logically, decreased sensitivity to withdrawal symptoms ought to make quitting cigarettes more bearable.

The present literature review yielded a single study involving anticholinergic treatment for smoking cessation (Bachynsky, 1986). The author of that study reported a 42% cessation rate for males and a 37% cessation rate for females at a 12-month follow-up. His study involved 500 subjects who received bi-weekly doses of atropine, scopolamine, and chlorpromazine, which are several types of anticholinergics. The initial dosage was administered by injection; succeeding dosages were taken orally. Bi-monthly physician check-ups followed for one year.

Bachynsky's study suggests that anticholinergics yield good success rates. Unfortunately, the potential side effects of anticholinergics are many and significant: disorientation, incoherence, hallucinations, sedation, depression, muscular weakness, tachycardia, blurred vision, difficulty swallowing, constipation, nausea, vomiting, and urinary retention (McVan, Blake, & DaCunha, 1989, p. 348). Careful consideration must be given before using such a class of drugs. Also, the success of anticholinergics could be due primarily to their aversive qualities rather than their diminishing of sensitivity to withdrawal symptoms.

Nicotine Gum

A third physiological intervention is nicotine gum. Nicotine gum is a tool of fairly recent origin that has received a substantial amount of attention in the

literature. Only the 2 mg gum is available in the United States, whereas in Europe both the 2 mg and 4 mg varieties are in use. The principle of nicotine gum treatment is that it allows the patient to address the social, habitual, and psychological effects of smoking cessation without the added encumbrance of suffering nicotine withdrawal symptoms. Numerous studies attest to the efficacy of nicotine gum in reducing withdrawal symptoms (Hatsukami, Hughes, & Pickens, 1985b; Hughes & Hatsukami, 1985; Pinto, Abrams, Monti, & Jacobus, 1987; Pomerleau et al., 1986; Russel & Jarvis, 1985; Schneider, Jarvik, & Forsythe, 1984; West, 1984).

Many people desire to quit smoking, and even have substantial social encouragement to do so; yet they find the physiological symptoms of withdrawal overwhelming. Nicotine gum allows the person to continue to experience nicotine highs while they stop smoking. After having successfully quit cigarettes, the person then gradually reduces his nicotine intake from the gum--which is apparently much less difficult than attempting the same task with cigarettes.

Effects on withdrawal symptoms. West et al. (1984) studied the effects of varying amounts of nicotine in the gum. In monitoring the symptoms of 48 smokers, who had just quit an average of 25 cigarettes per day, it was found that 0.5 mg dosages relieved no withdrawal symptoms. In contrast, 2 mg dosages consistently relieved irritability and depression. However, the 2 mg dosage did not affect the

common cigarette withdrawal symptoms of increased hunger and decreased concentration.

West, Hajek and Belcher (1987) conducted an experiment in which 52 smokers abstained from smoking for 4 weeks, replacing the cigarettes with nicotine gum. During the 4-week period, baseline levels of irritability, depression, hunger, restlessness, and inability to concentrate were ascertained. Next followed 4 weeks in which the subjects were allowed neither cigarettes nor nicotine gum. Upon nicotine gum removal, all monitored withdrawal symptoms increased significantly beyond baseline. Thus nicotine gum was effective in controlling these effects of cigarette withdrawal.

Hatsukami, Hughes and Pickens (1985a) had 100 subjects assigned to either a nicotine gum or a placebo gum treatment for 4 days. During this time they were not allowed to smoke. In comparison to the placebo group, the nicotine gum group exhibited less irritability, anxiety, difficulty in concentration, restlessness, impatience, and somatic complaints. Even so, the nicotine gum was not effective in reducing cigarette craving nor in combating increased appetite. The brevity of the study might account for the lack of effect on cigarette craving, as that phenomenon could be understood as a habit response rather than a withdrawal symptom.

In summary, nicotine gum appears capable of alleviating most withdrawal symptoms--with the notable exception of

increased hunger and, perhaps to a lesser extent, cigarette craving. Moreover, this capacity cannot be attributed to the placebo effect.

Effectiveness in cessation. Nicotine gum can reduce most withdrawal symptoms, but how effective is it in helping people quit cigarettes? The following ten studies answer that question. The first two studies examined just nicotine gum. The other eight studies combined nicotine gum with other techniques, in order to enhance its effectiveness.

Jarvik and Schneider (1984) tested the effectiveness of nicotine gum in a study involving 48 smokers. Twenty-five subjects received 2 mg nicotine gum, and 23 were given placebo gum. At 12-month follow-up 28% of those given nicotine gum were abstinent vs. 17% of those given the placebo gum, a difference which was not statistically significant. Interestingly, at the outset of the study all subjects were administered the Fagerstrom Tolerance Questionnaire (Fagerstrom, 1978), and the results were analyzed to see whether the effectiveness of nicotine gum varied by degree of nicotine dependence. Of the 25 subjects who were in the nicotine gum group, only those rated highly dependent were among those abstinent at the 12-month follow-up. Among highly nicotine-dependent smokers, Jarvik and Schneider found an abstinence rate of 41% (7 of 17) with nicotine gum treatment, compared to 0% (0 of 8) in the low-dependent group, a difference which is statistically

significant ($p < .05$). Fagerstrom Tolerance Questionnaire scores appear useful in predicting nicotine gum success.

Kornitzer, Kittel, Dramaix and Bordoux (1987) conducted a comparison of 2 mg and 4 mg nicotine gum on 199 subjects. Although the study was intended to determine which is the superior dosage, it also provided information as to the effectiveness of nicotine gum in general. They found at 12-month follow-up that the 2 mg group had a 22% cessation rate and the 4 mg group had a 32% cessation rate. (Five of the one hundred ninety-nine subjects did not provide information at the 12-month follow-up, and the reseachers did not count them in their calculations. Regarding them as continuing smokers, as will be done for all studies in this review, the rates drop slightly: 21% for the 2 mg group and 30% for the 4 mg group.) The average abstinence rate of the two conditions was 25%, counting dropouts as continuing smokers.

Nicotine gum in combination with other treatments. Tonnesen et al. (1988) measured 173 subjects in terms of nicotine dependence, and placed them into High, Medium, and Low dependence categories. High subjects were treated with either 4 mg or 2 mg nicotine gum; Medium and Low subjects were given either 2 mg nicotine gum or a placebo. All subjects were involved in group counseling. These groups consisted of 12 to 15 members, were led by a physician, and met six times for 60-minute to 90-minute sessions. Group discussion focused on gum use and mutual support. Results are displayed in Table 2. Note that the greater dosage of

nicotine was more beneficial to the subjects who were highly dependent on nicotine. Also, the 2 mg nicotine gum helped subjects with lower dependence more than those of higher dependence.

Table 2

Abstinence Rates among Treatments in the Tonnesen et al. Study

	Treatment			
Interval	High/4 mg	High/2 mg	Med-Lo/2 mg	Med-Lo/0 mg
6 mos.	56%	30%	47%	26%
12 mos.	44%	12%	38%	23%

Two of the three treatment conditions included in a study by Hall et al. (1985) involved a group receiving nicotine gum plus a low-contact intervention (n = 45) and a group given nicotine gum plus an intensive behavioral program (n = 38). (These sample sizes include six dropouts, who were not included in calculations by Hall et al., but will be included here and regarded as smokers.) The low-contact intervention involved four meetings over 3 weeks in which subjects completed written exercises on reasons for smoking, read educational materials on smoking and health,

participated in group discussions, and had nicotine gum available for use. The behavioral program consisted of aversion therapy, training in relapse prevention skills, completing written exercises designed to increase commitment, and relaxation training. The treatment group schedule involved fourteen 75-minute sessions over an 8-week period, with sessions massed early in treatment and gradually fading in frequency. Abstinence was assessed via self-report, breath carbon monoxide (10 ppm cut-off), and--for those claiming abstinence--blood thiocyanate level. Follow-ups at 3, 12, and 26 weeks showed the combination of behavioral treatment plus nicotine gum to yield significantly higher abstinence rates (86%, 68%, 53%, respectively) than the nicotine gum with low-contact condition (76%, 53%, 42%, respectively). By 1-year follow-up, however, the significant difference between treatment effects had vanished: 42% for the nicotine gum plus behavioral treatment intervention vs. 33% for the nicotine gum plus low contact intervention.

A subsequent study was conducted by Hall et al. (1987) that utilized a 2 x 2 factorial design. One factor contrasted intensive behavioral vs. low-contact programs; the other contrasted nicotine vs. placebo gums. The subjects (N = 139) were equally divided among the four conditions, and abstinence rates were assessed at 6- and 12-month follow-ups. Eleven (8%) dropped out, and were regarded as smokers in Hall et al.'s calculations. Results

are displayed in Table 3. As can be seen, the intensive behavioral program had an adverse effect on the abstinence rates of subjects, regardless of the type of gum used.

Table 3

Abstinence Rates among Treatments in the Hall et al. Study

Treatment	Interval	
	6 months	12 months
Nicotine gum		
Low contact	56%	50%
Behavioral	43%	34%
Placebo gum		
Low contact	35%	21%
Behavioral	21%	21%

Lando, Kalb and McGovern (1988) assessed the effectiveness of adding a behaviorally-oriented self-help booklet to nicotine gum treatment. All subjects (N = 304) were administered the nicotine gum; in addition, one condition included the self-help booklet, while the other group received a control factual information pamphlet. It was found that the self-help booklets did not increase abstinence rates at 6-month and 12-month follow-ups; those

respective rates were 24% and 19% for the book plus gum condition compared to 29% and 22% for the gum alone condition. It should be noted that subject use of nicotine gum was low: after just 1 week, only 217 of the 304 subjects were using the gum; by 1 month, the number using it had decreased to 152; it dropped to 76 by 6 months, and to a mere 64 at the 12-month follow-up. Hence the low abstinence numbers may not imply that nicotine gum is ineffectual.

In an approach similar to that just cited, Harackiewicz, Blair, Sansone, Epstein and Stuchell (1988) also combined nicotine gum with a self-help booklet. This booklet contained a variety of coping strategies for controlling the urge to smoke, and it presented means of responding to brief relapses. During the initial interview, current patterns and purposes of smoking were discerned, the proper and effective use of nicotine gum was explained, a quit date was set, and the gum and booklets were distributed. Subject self-reports of abstinence were verified in as many cases as possible (69%) by breath carbon monoxide and saliva thiocyanate analyses. Abstinence rates were modest: 14% at 6 months and 12% at 12 months.

Sixty-four subjects had aversion training and skills training and then were assigned to three treatment groups by Killen, Maccoby and Taylor (1984): nicotine gum alone; training group alone; and gum plus training. The training consisted of teaching self-regulation skills for the specific purpose of maintaining abstinence from cigarettes.

As a control condition, those in the gum-only group met with their physicians in low contact situations (getting prescriptions refilled and having the CO content of expelled air measured). Prior to the 7-week program, all subjects met together for 4 consecutive days to receive aversion training and skills training. (The aversion training is described in greater detail on page 46 of this review.) Results at 10.5-month follow-up showed abstinence rates of 23% for the gum only group, 30% for the training only group, and an impressive 50% for the combination group.

In a 2 X 2 study by Schneider et al. (1983), 60 subjects were given either nicotine gum or placebo gum, and given either clinic support or no support. Clinic support consisted of 45-minute sessions in which breath CO, heart rate, weight, and withdrawal symptoms were measured, and problems encountered in attempting cessation were discussed. Sessions were held daily the first week, then weekly for the next 4 weeks. Six months following this treatment, those receiving clinic support had abstinence rates of 48% and 20% in the nicotine and placebo groups, respectively. At 12 months for these groups, the respective rates were 30% and 20%. Much lower abstinence rates were achieved by the no-support groups: 15% for nicotine gum and 18% for placebo gum at 6 months; 8% for nicotine gum and 13% for placebo gum at 12 months.

Subjects in a study by Goldstein, Niaura, Follick and Abrams (1989) received nicotine gum with either behavioral

skills training or with an education treatment. Subjects met in groups of 6 to 13 members for 10 sessions over an 11-week period. The behavioral treatment utilized stimulus control, cognitive restructuring, relapse prevention, relaxation training, problem solving, and time management. The education treatment provided subjects with materials about smoking and health, taught smoking cessation strategies, and offered "nonspecific group support." Subject reports of abstinence were chemically verified by saliva cotinine and breath carbon monoxide analyses. Eighteen of the forty-nine subjects (37%) receiving behavioral skills training were abstinent at 6-month follow-up, as opposed to 7 of 40 (18%) for the education treatment.

These statistics in Goldstein et al.'s study are somewhat inflated, however, as 18 of the 107 subjects (17%) who began the experiment dropped out during treatment and were not subsequently calculated in the analyses. The original number of subjects in each of the conditions was not reported, so exact calculation of the abstinence rates that would include these dropouts cannot be done. Since for all other studies in this review dropouts are counted as nonabstainers, it is preferable here to generate an estimated statistic. Dividing the 18 dropouts proportionately among the two groups according to their ending size yields estimated original group sizes of 59 for the behavioral skills training treatment and 48 for the education treatment. The resulting abstinence rates are

therefore corrected to 31% for the behavioral group and 15% for the education group.

Shipley (1986) treated 65 subjects with a combined single-session treatment of hypnosis, gradual reduction, and nicotine gum. Gradual reduction involved a process of brand switching, from those higher in nicotine content to those brands that are lower. Abstinence was assessed by subject report plus confirmation by an informant. At 6-month follow-up, a corrected 19% of the subjects were abstinent.

Conclusions on nicotine gum research. A summary of the nicotine gum studies in this review is presented in Table 4. The variation of abstinence rates is considerable, ranging from 8% to 56%, and it is fairly evenly distributed across that range. Eleven studies reported both 6-month and 12-month abstinence rates; the mean and median rate decrease over the seventh through the twelfth months was 9%.

Several conclusions regarding nicotine gum can be drawn from this literature. First, the 4 mg gum appears more effective for highly nicotine-dependent persons, while 2 mg gum is more appropriate for those with less dependence. Availability of the 4 mg gum should be reconsidered by the U.S. Food and Drug Administration, as any side effects of 4 mg nicotine gum are presumably far less severe than the main effects of failure to quit smoking cigarettes.

A second conclusion is that combining other treatments with nicotine gum does not consistently increase the

effectiveness of the intervention. The average abstinence rates of the nine interventions that included only nicotine

Table 4
Abstinence Rates of Nicotine Gum (NG) Treatments

Treatment	Investigators	Interval 6 months	12 months
NG	Jarvik & Schneider	--	28%
NG	Kornitzer et al.	--	21%
NG	Hall et al.(1985)	42%	33%
NG	Hall et al.(1987)	56%	50%
NG	Lando et al.	29%	22%
NG	Schneider et al.	15%	8%
4mg NG	Kornitzer et al.	--	30%
4mg NG+counseling	Tonnesen et al.	56%[a]	44%[a]
NG+counseling	Tonnesen et al.	30%[a]	12%[a]
NG+counseling	Tonnesen et al.	47%[b]	38%[b]
NG+smokholding	Killen et al.	--	23%[c]
NG+training+smokholdng	Killen et al.	--	50%[c]
NG+behavioral	Hall et al.(1985)	53%	42%
NG+behavioral	Hall et al.(1985)	43%	34%
NG+behavioral	Goldstein et al.	31%	--
NG+behavioral+hypnosis	Shipley	20%	--
NG+education	Goldstein et al.	15%	--
NG+book	Harackiewicz et al.	14%	12%
NG+book	Lando et al.	24%	19%
NG+support	Schneider et al.	48%	30%

[a]Rate is for high nicotine dependent subjects.
[b]Rate is for low nicotine dependent subjects.
[c]Rate is from 10.5-month follow-up study.

gum were 34% at 6 months and 26% at 12 months; the average abstinence rates of the ten interventions that included nicotine gum in combination with other treatments was 31% at 6 months and 26% at 12 months. Also, four studies directly compared nicotine gum alone to combination treatments: in two of these studies the combination treatment fared better than nicotine gum alone, while in the other two studies the

added techniques actually detracted from nicotine gum's effectiveness.

A third conclusion is that nicotine gum's effectiveness cannot be accounted for by the placebo effect. Despite placebo gum's surprisingly high success rates (see Table 1, page 8), these are still 9% lower than the average rates posted by actual nicotine gum.

Gradual Reduction

The final intervention to be reviewed in this section is gradual reduction. This technique involves methodically reducing the amount of nicotine the client receives. The principle involves finding and utilizing a rate slow enough so that the discomfort of withdrawal is not of such severity as to drive the patient back to the drug.

Seven studies will be reviewed in this section. The first three deal exclusively with interventions involving only gradual reduction. The remaining four studies include combinations of gradual reduction with other techniques.

The first study to be considered was conducted by Glasgow et al. (1984). They compared the effects of gradual reduction with abrupt disruption. With subjects acquired at a single worksite, Glasgow et al. monitored nicotine consumption by noting the nicotine content of the brand used by each subject, the percentage of each cigarette smoked, and the number of cigarettes consumed. In both conditions subjects reduced their nicotine consumption. Moreover, many maintained this reduction at a 6-month follow-up. Cessation

rates for the gradual condition (n = 12) was 33%; for the abrupt condition (n = 13) it was 0%. Reflecting on this they conservatively commented that there "was some indication that the gradual reduction condition was more effective than the abrupt condition" (p. 137). Eleven other subjects were in a "gradual plus feedback" condition, which yielded a 6-month abstinence rate of 0%. Note that cessation was the goal of only 19 of the 36 subjects in this study; the other 17 merely wanted to reduce their cigarette consumption. For those subjects whose goal was abstinence--one of the conditions for inclusion in this review--the gradual reduction treatment had a 6-month success rate of 63% (12 of 19).

Foxx and Axelroth (1983) used a two-phase gradual reduction procedure with 12 subjects. In the first phase, which lasted 3 weeks, the subjects switched brands weekly to ones lower in nicotine content. In the second phase, which also lasted 3 weeks, the subjects systematically reduced the number of cigarettes they smoked so that at 21 days their consumption was reduced to zero. Results showed that four subjects (33%) remained abstinent at a 12-month follow-up.

Prue, Davis, Martin and Moss (1983) also utilized a brand fading program, although the format of this experiment differed from that of Foxx and Axelroth. Prue et al. provided a written manual on brand fading to 30 smokers, and they lent structure to the experiment with brief phone calls to the subjects. Prue et al. obtained a 27% abstinence rate

at 6 months and a 23% abstinent rate at 12 months. One of the ten subjects serving as a waiting list control was also abstinent at 6 months.

Gradual reduction in combination with other treatments. A gradual reduction design was implemented by Scott, Prue, Denier and King (1986), with 29 Veteran's Administration hospital nurses serving as subjects. Ten of the subjects were placed in a control condition, while nineteen received a treatment involving nicotine fading, abstinence training, and carbon monoxide feedback. Self-report and breath carbon monoxide assessment were utilized to determine abstinence. At 6-month follow-up none of the control subjects were abstinent. Only two (11%) of the treatment subjects did not smoke at all from the end of treatment to the 12-month follow-up. Two others (total of 21%) met Scott et al.'s definition of abstinent at the 6-month and 12-month follow-up studies. (Scott et al. reported higher rates, due to their excluding from calculation 4 subjects who dropped out and 4 other subjects who "had [not] tried to quit.")

Lando and McGovern (1985) conducted a smoking cessation study with 130 subjects, whom they divided into four groups. One of the groups (n = 42) received a gradual reduction treatment and maintenance program, while a second group was administered the same treatment and maintenance in combination with smokeholding (n = 41). Smokeholding involved the subjects retaining the inhaled smoke for an aversive length of time. Results at 6-month and 12-month

follow-ups yielded respective abstinence rates for the gradual reduction plus smokeholding treatment of 51% and 44%, compared to rates of 21% and 19% for the gradual nicotine reduction with maintenance program treatment. A third group (n = 23), who received only the gradual reduction treatment, achieved 6-month and 12-month abstinence rates of 35% and 26%, respectively.

Brown, Lichtenstein, McIntyre and Harrington-Kostur (1984) conducted two similar studies. In the first study, 30 subjects participated in a nicotine fading program. Seven weekly group sessions were held. Gradual reduction took place during the first four weeks, and the fourth session was the quit date. Twenty-four of the subjects then received a relapse prevention treatment for the final three sessions, while the remaining six subjects were instead provided "nonspecific group support and discussion." Abstinence data was obtained through self-report in conjunction with reports by "informants" who were familiar with the subject's smoking patterns. At 6-month follow-up 46% of the gradual reduction plus relapse prevention group were abstinent, compared to 0% of the gradual reduction only group.

In their second study Brown et al. compared the same gradual reduction plus relapse prevention program to conditions involving only one or the other elements. Assessment of smoking pattern involved self-report, informant substantiation, and breath carbon monoxide

measurement. Respective 6-month and 12-month abstinence rates were 25% and 19% for the gradual reduction plus relapse prevention group, 7% and 7% for the gradual reduction alone group, an 13% and 0% for the relapse prevention alone group.

Beaver, Brown and Lichtenstein (1981) tested the hypothesis that a program including anxiety management along with gradual nicotine reduction would be more effective than a gradual reduction program alone. The subjects (n = 25) were separated into high and low trait-anxious groups, and then randomly assigned to one of the two treatment conditions. No significant difference was found in the 6-month follow-up abstinence rates, and in fact the trend was in the opposite direction: 27% (3 of 11) were abstinent in the reduction only group, and 7% (1 of 14) were abstinent in the reduction plus management group.

Conclusions on gradual reduction research. Table 5 summarizes the studies on gradual reduction. Comparing 6-month to 12-month rates within studies suggests that the rates remain fairly stable over the seventh through twelfth months: seven studies in this review list abstinence rates at both intervals; both the mean and the median drops in rate were just 4%.

As Table 5 displays, 6-month success rates vary widely for gradual reduction treatments. These rates vary from 0%-63%. This may be due in part to the fact that only the Prue study and the two "combination" conditions in the Lando

Table 5
Abstinence Rates of Gradual Reduction (GR) Treatments

Treatment	Investigators	Interval	
		6 months	12 months
GR	Glasgow et al.	63%	--
GR	Foxx & Axelroth	--	33%
GR	Prue et al.	27%	23%
GR	Lando & McGovern	35%	26%
GR	Brown et al.[a]	0%	--
GR	Brown et al.[b]	7%	7%
GR	Beaver et al.	27%	--
GR+smokeholding	Lando & McGovern	51%	44%
GR+relapse prevention	Lando & McGovern	21%	19%
GR+relapse prevention	Brown et al.[a]	46%	--
GR+relapse prevention	Brown et al.[b]	25%	19%
GR+relapse prevention+[c]	Scott et al.	21%	21%
GR+anxiety management	Beaver et al.	7%	--

[a]First study.
[b]Second study.
[c]CO feedback.

study had sample sizes in excess of 24 subjects. Hence, the unusually high and unusually low abstinence rates may not accurately represent the effectiveness of that treatment on the total population of smokers. Also, by 12 months the cessation rates close ranks: Six of these nine rates fall between 19% and 26%.

In combination with other techniques, the success rates of gradual reduction interventions do not substantially change. This proved true for an array of adjunct techniques, including abstinence training, carbon monoxide feedback, maintenance programs, anxiety management, and Brown et al.'s "relapse prevention" treatment. (The same relapse prevention treatment was used in study 1 and study 2 by Brown et al.; the impressive 46% rate of the first study

did not hold up in the replication study.) There is one notable exception to this general trend, which involved the combination of gradual reduction with aversion therapy (Lando & McGovern, 1985). The 6-month and 12-month success rates of this intervention are rivaled by few others in this review, therefore warranting a replication study.

Psychological Interventions

Having discussed the recent literature on physiological interventions, we now turn to those interventions that are psychological in nature. This section will cover five such psychologically-oriented interventions for smoking cessation: restricted environmental stimulation therapy, hypnosis, aversion therapies, contingent reinforcement, and cognitive-behavioral skills training. These treatments are categorized as psychological because they primarily address the smoker's attitude, disposition, and conscious or unconscious thoughts or feelings toward cigarettes. Although restricted environmental stimulation therapy and the aversion therapies are implemented at the physiological level, the intent--and hence presumed effective element--of these two interventions is to alter the smoker's psychological attitude toward cigarettes. To one of these we now turn.

Restricted Environmental Stimulation Therapy (REST)

REST works on a principle similar to that of hypnosis (see page 35 for a discussion on hypnosis): it places the

client in a mental state that is more receptive to an alteration in psychological disposition toward cigarettes. Suedfeld and Baker-Brown (1987) conceptualized the beneficial effects of REST on smoking this way: "The therapeutic impact of REST depends partly on stimulus need, which leads subjects to attend more closely to messages, respond to them in a more accepting and positive fashion, and remember them better" (p. 263).

Deaton (1983) hypothesized that REST also assists clients in coping with the negative emotions associated with quitting through self-control rather than cigarette relapse. And in addition to addressing smoking cessation, REST claims the benefits of reducing tension, anxiety, headaches, and insomnia for up to six months following treatment (Deaton, 1983).

The procedure of REST involves having the subject lie on a bed for 1 to 24 hours in a completely dark, sound-reduced room. For the longer stays, food is administered as desired in liquid form through a tube. During this time taped messages are provided on smoking cessation, health attitudes, and health behavior. Questions are asked at the end of each message to enhance the probability of active listening and to increase comprehension.

Suedfeld and Baker-Brown (1987) tested the effectiveness of restricted environmental stimulation therapy (REST). They employed a 2 X 4 design, with one factor being 12- vs. 24-hour REST sessions and the other

factor having four message presentation schedules. Results showed no significant differences among the eight conditions, and overall abstinence rates among the 83 subjects were 34% at 6 months and 21% at 12 months.

REST in combination with other treatments. Best and Suedfeld (1982) compared the effectivenesses of REST alone, a program of behavioral self-management, and a combination intervention. Fifteen subjects received each treatment. The REST condition lasted 24 hours. Abstinence was determined primarily through mailed questionnaires, with follow-up telephone contact made to those not returning the questionnaires. Results showed that the multiple treatment condition posted significantly higher abstinence rates over the other two treatments at both 6-month and 12-month follow-ups: The respective rates for the multiple treatment condition were 73% and 53%. The abstinence rates for self-management only were 13% at 6 months and 27% at 12 months; for the REST only condition the abstinence rate was 20% at both follow-ups. (Best and Suedfeld reported 21% for the REST only condition because they excluded one drop-out from their calculations.)

In a study described in more detail elsewhere in this review (pages 39-40), Barabasz, Baer, Sheehan and Barabasz (1986) placed a five-phase hypnosis technique into five treatment modalities. One of those modalities, "Condition V" (n = 30), immediately preceded the hypnosis with 60 to 90 minutes of REST. Follow-up data were obtained by telephone

interview 19 months following conclusion of the treatment, at which time 14 subjects (47%) reported abstinence.

Conclusions on REST research. Table 6 presents the abstinence rates of the preceding REST studies. Although the number of studies is small, an emerging trend that can be distinguished is that combination treatments fare better than the use of REST alone.

Table 6

Abstinence Rates of REST Treatments

Treatment	Investigators	6-mo. rate	12-mo. rate
REST	Best & Suedfeld	20%	20%
REST	Suedfeld & Baker-Brown	34%	21%
REST+behavioral	Best & Suedfeld	73%	53%
REST+hypnosis	Barbasz et al.	--	47%[a]

[a]Rate is from 19-month follow-up study.

The small literature on REST as a smoking cessation technique yields a diversity of success rates. More studies are needed in order for research consumers to determine the treatment's effectiveness. A tentative conclusion that can be drawn is that REST is an effective adjunct treatment to other psychologically oriented interventions.

Hypnosis

The literature is not in agreement as to the effective mechanism of action involved in hypnotherapy. Some see hypnosis as placing the patient in an altered state of consciousness, whereas others regard it in terms of a behavioral response to a particular set of instructions (Gentry, 1984, pp. 492-493). A lengthy discussion on this unresolved debate is beyond the scope of this review; sufficient for the purposes of this paper is Schubert's (1983) useful description of how hypnosis aids in the treatment of cigarette smoking:

> According to the misconception hypothesis, psychological disturbances are a result of misconceptions a person has about himself and his relationship to the world. It would follow, then, that cigarette dependency results from misconceptions that a person has about himself in relation to his smoking habit. In order to resolve this problem, therefore, a person would need to change his misconceptions to accurate conceptions about his relationship to his habit. If a person is motivated to change his conceptions and if he is in a suggestible state, it follows that this state will facilitate the modification of these conceptions and thereby change the behavior itself. Therefore, on a theoretical basis, it would be expected that hypnosis would be effective in the treatment of cigarette habituation. (p. 199)

Interestingly, some research indicates that the effectiveness of hypnosis on smoking cessation is independent of the subject's hypnotic susceptibility (Cornwell, Burrows & McMurray, 1981; Stanton, 1985). Other studies disagree, an example being Baer et al.'s finding of a "weak correlation" between hypnotizability and number of

months of abstinence from cigarettes (Baer, Carey & Meminger, 1986).

A more conclusive study supporting the relationship between hypnotizability and effectiveness of hypnotherapy for smoking cessation was conducted by Schubert (1983). Using 87 subjects, he compared the effectiveness of a hypnosis treatment to one using relaxation training. Each treatment involved four individual, weekly sessions. All subjects were rated in terms of their hypnotizability, and then divided into upper two-thirds and lower-third classifications. Hypnotherapy was found to be more effective than relaxation in reducing cigarette consumption at 4-month follow-up in the more highly hypnotizable subjects. This did not hold true for the lower third classification group.

In analyzing follow-up data on 307 subjects, Barabasz, Baer, Sheehan and Barabasz (1986) also concluded that hypnotizability correlated positively with hypnosis treatment effectiveness. As might be expected, they also found hypnotist experience level and client-therapist contact time as being other significant variables contributing to the success rate of hypnotherapy in smoking cessation.

Next to be presented is a review of the recent literature on the effectiveness of hypnosis in smoking cessation. The treatments found were quite diverse, varying in therapist experience level, client contact time, group

vs. individual format, specific hypnosis technique, content of the verbalizations made to the hypnotized client, and other salient elements. Each study will be briefly described, and then a summary section will present several conclusions.

Williams and Hall (1988) assigned 60 subjects to three treatment groups. For one of the groups the treatment consisted of a single 2-1/2 hour session of hypnosis. While hypnotized the subjects were told they no longer desired to smoke and would never smoke again for any reason. A post-hypnotic suggestion was given that directed the subject, when tempted to smoke, to take a deep breath, subvocally repeat the word "relax," and drink a glass of water. At 48-week follow-up a 45% abstinence rate was found.

No significant difference in abstinence rates was found between subjects receiving a hypnosis treatment vs. those in an attention-placebo condition at 3-month and 6-month follow-ups in a study conducted by Hyman, Stanley, Burrows and Horne (1986). The attention placebo condition consisted of four 1-hour discussions about smoking. In addition, they were told at the close of the first session that they were expected to stop smoking without help. Subjects in the hypnosis condition received four 1-hour, individual sessions. During hypnosis the client was repeatedly told three things: (a) for your body smoking is a poison; (b) you owe your body respect and protection from smoking; and (c) life as a nonsmoker means a far healthier, longer life,

clear lungs, mouth and clothes, and great personal pride for having given up the habit. Abstinence was assessed by a mailed questionnaire. The cessation rate Hyman et al. obtained for both the treatment (n = 15) and the attention-placebo (n = 15) groups at 3-month and 6-month follow-ups was 40%. Note that the placebo rate is higher than many treatment cessation rates examined in this review.

Neufeld and Lynn (1988) instructed 27 subjects in a self-hypnosis technique. This technique involved visualizations of secure, relaxing, and successful images regarding smoking cessation. Also involved was a personal anchor, "cue-controlled relaxation and mastery feelings achieved by the physical gesture of touching two fingers together or a ring that has special significance." Accompanying this treatment was education regarding smoking cessation and a manual designed to assist with maintenance of cessation. Two categories of abstinence were measured: no cigarettes smoked in the past 30 days, and no cigarettes smoked since treatment. Assessment of cigarette use was conducted by telephone, using subject verbal report. At 6-month follow-up 5 subjects (19%) reported abstinence, all claiming to have not smoked since treatment.

Frank, Umlauf, Wonderlich and Ashkanazi (1986) compared three variables in their study: 2-session to 4-session hypnosis; use vs. non-use of a booster session; and weekly vs. bi-weekly scheduling of sessions. One group hypnosis technique was utilized for all treatment conditions. Four

to eight subjects comprised each group, and a total of 63 subjects participated in the study. At 6-month follow-up, which was conducted using telephone calls and written questionnaires, no significant difference in abstinence rates was found among the various conditions. Twelve of the sixty-three subjects (19%) were abstinent.

Hypnosis in combination with other treatments. Barabasz, Baer, Sheehan and Barabasz (1986) placed a five-phase hypnosis technique into five treatment modalities. Condition I (n = 83) entailed the technique administered by experienced hypnotherapists. Condition II (n = 45) involved the same technique administered by interns in their first course in supervised training of hypnosis. (Nonexperienced hypnotists were used only in Condition II.) Condition III (n = 66) administered the technique in a group setting. Condition IV (n = 20) added booster sessions, which involved supportive discussion. Condition V (n = 30) preceded the hypnosis with 60 to 90 minutes of REST. Follow-up data were obtained by telephone interview. Abstinence rates were as follows: 28% at 17 months for the first condition; 13% at 9 months for the interns; 36% at 10 months for the group treatment; 30% at 17 months for those who received booster sessions; and 47% at 19 months for the hypnosis/REST combination condition.

As reported earlier in this review (page 23), Shipley (1986) treated 65 subjects with a combined single-session treatment of hypnosis, gradual reduction, and nicotine gum.

At 6-month follow-up, a modest 19% of the subjects were abstinent.

Conclusions on hypnosis research. Table 7 displays the abstinence rates of the treatment conditions discussed in this section on hypnosis interventions. Direct assessment of the loss of treatment effectiveness in the seventh

Table 7
Abstinence Rates of Hypnosis Treatments

Treatment	Investigators	Interval	
		6 months	12 months
Hypnosis	Hyman et al.	40%	--
Hypnosis	Williams & Hall	--	45%
Hypnosis	Frank et al.	19%	--
Hypnosis	Barabasz et al.[a]	--	28%
Hypnosis	Barabasz et al.[b]	13%	--
Hypnosis	Barabasz et al.[c]	36%	--
Hypnosis	Barabasz et al.[d]	--	30%
Hypnosis+education	Neufeld & Lynn	19%	--
Hypnosis+REST	Barabasz et al.[e]	--	47%
Hyp+NG+grad reduction	Shipley	19%	--

[a]Rate at 17 months for "Condition I."
[b]Rate at 9 months for "Condition II."
[c]Rate at 10 months for "Condition III."
[d]Rate at 17 months for "Condition IV."
[e]Rate at 19 months for "Condition V."

through twelfth months following hypnosis interventions is not possible, since no studies reported abstinence rates at both 6-month and 12-month intervals.

The literature reports a wide variety of success rates for hypnosis. This appears due to several factors: therapist characteristics, method of administration, and specifics of the technique. Regarding therapist

characteristics, experience level and ability to establish trust are critical variables, and undoubtedly were not constant across studies. Hypnosis approaches varied as to method of administration, single or multiple sessions, and individual or group administrations. And for technique specifics, no standardized approach exists that is universally applied to a client under hypnosis. Some hypnotists used aversive imagery with hypnotized clients, while other hypnotists emphasized the benefits of smoking cessation. Not all hypnotists utilized post-hypnotic suggestion. And for those who did, some patients received encouragement while others were given directives.

Several conclusions can be drawn from the above studies. One is that combining hypnosis with other techniques generally does not increase its efficacy, with the possible exception of REST. The one study that combined REST and hypnosis found 14 of 30 subjects abstinent one year following the intervention. This rate cannot be attributed to REST's effectiveness alone, as REST's 12-month success rate appears to be about 20%. (See Table 6, page 34.)

Other conclusions that can be drawn from this review are that (1) multiple hypnosis sessions did not prove to be any more effective than single sessions, and (2) hypnotist experience level and client hypnotizability significantly increased treatment efficacy.

Aversion Therapies

A third class of psychological interventions employed in the cessation of cigarette smoking are the aversion therapies. Aversion therapies are derived from classical conditioning theory: an aversive unconditioned stimulus (e.g., holding cigarette smoke in the lungs for an excessive period of time) is paired with the unwanted conditioned stimulus (i.e., smoking behavior). Nausea, the unconditioned response to the UCS, becomes a conditioned response to smoking behavior.

Six techniques found in this literature review have been placed under the general classification of "aversion therapies": rapid smoking; rapid puffing; Smoke-Them-Out-of-Pleasure; taste satiation; focused smoking; and smokeholding. These treatments have been placed in the broader category of "psychological interventions" for, although their immediate impact on the client is physiological, the lasting effects are upon the client's unconscious thoughts and feelings toward cigarettes.

First to be reviewed are the studies on the similar techniques of rapid smoking and rapid puffing. Corty and McFall (1984) divided 39 subjects into two groups. Subjects, ranging in age from 20 to 59, had averaged 30 cigarettes per day for 18 years. One group (n = 21) received a rapid smoking treatment. This involved smoking continuously for 6 minutes, taking a 5-minute break, then repeating this procedure twice. Eight such sessions

comprised the treatment. At 6-month follow-up only 19% of the rapid smoking treatment subjects were abstinent. (The authors report 23% cessation due to excluding 4 subjects who did not complete the treatment.)

Erickson, Tiffany, Martin and Baker (1983) compared a rapid smoking treatment (n = 10) to a rapid puffing treatment (n = 9). The rapid smoking treatment involved 6 90-minute sessions over a 2-week period. The subjects sat in a small room (so as to quickly fill with exhaled smoke) and inhaled from a cigarette every 6 seconds. This continued until they completed three cigarettes or felt unable to finish. After a 5-minute break, the procedure repeated twice. The rapid puffing condition was identical to this, except that subjects were directed to take the smoke only to their mouths--not their lungs--hold it for a moment, and then exhale. Abstinence was defined as never resuming daily smoking plus no use of tobacco in the 2 weeks preceding the follow-up study. Smoking status was determined by subject report. No significant difference in abstinence rates emerged at 6-month and 12-month follow-ups between the rapid smoking and rapid puffing conditions. Eleven of the nineteen subjects (58%) in the two conditions were abstinent at 6 months, and ten (53%) remained abstinent at 12 months.

Another aversive treatment used in smoking cessation is "STOP," an acronym for Smoke-Them-Out-of-Pleasure. STOP involves chain smoking while exhaling only through the

nostrils, all the while trying to enjoy the cigarette and feel relaxed. This technique differs from rapid smoking and rapid puffing in that draws on the cigarette are not taken on a specific, timed cue. Lando (1981) tested two independent variables with the STOP technique: intensive vs. minimal contact, and two-stage vs. three-stage procedures. At 12-month follow-up the intensive, two-stage treatment boasted a significantly superior abstinence rate (11 of 24, or 46%) over the other three treatments (14-20%).

Walker and Franzini (1985) compared the effectiveness of focused smoking to taste satiation. Subjects receiving taste satiation (n = 32) participated 45 minutes per day for 5 consecutive days. A group procedure was utilized, with 16 subjects in each session. During the sessions the subjects were seated facing a blank wall. A relaxation technique was then administered, followed by a focusing of attention on sensations in one's lungs, throat, and mouth. The subjects then began to smoke a cigarette. Swishing the smoke around in the mouth for 30 seconds, breathing through the nose, subjects were directed to focus on the aversive sensations evoked by the smoke. They then exhaled the smoke through the mouth. A second draw was taken on the cigarette, and the smoke was held for 20 seconds. This was followed by taking the smoke into the lungs and exhaling it through the nose. These two procedures were alternated to a total of five times each. The cigarette was then extinguished and a 5-minute break taken. The entire sequence was repeated for

three more cigarettes. The focused smoking condition (n = 12) was alike in all respects to the taste satiation condition, except that the subjects were instructed to smoke at their normal pace. Abstinence was defined as breath CO less than 8 ppm and a self-report of smoking not more than one cigarette in the past 10 days. At 6-month follow-up, no significant differences in abstinence rate were found between taste satiation (28%) and focused smoking (19%).

These final two studies utilized an element common to several of the above-mentioned techniques: smokeholding. Smokeholding involves retaining the inhaled smoke for an aversive period of time. As discussed previously in this literature review (pages 27-28), Lando and McGovern (1985) conducted a smoking cessation study with 130 subjects, whom they divided into four groups. One of the groups (n = 42) received a gradual reduction treatment and maintenance program, while a second group was administered the same treatment and maintenance in combination with smokeholding (n = 41). Results at 6-month and 12-month follow-ups yielded respective abstinence rates for the smokeholding plus gradual reduction treatment of 51% and 44%.

Also mentioned earlier in this reveiw was Killen, Maccoby and Taylor's (1984) study (page 21). They assigned 64 subjects to one of three treatment groups: nicotine gum alone (n =22); training group alone (n = 20); or gum plus training (n = 22). The training consisted of teaching self-regulation skills for the specific purpose of maintaining

abstinence from cigarettes. As a control condition, those in the gum-only group met with their physicians in low contact situations (getting prescriptions refilled and having expelled air CO measured). Prior to the 7-week program, all subjects met together for 4 consecutive days to receive aversion training and skills training. The aversion training involved a smoke-holding technique in which the subject would hold a draw for 30 seconds while concentrating on the negative sensations it created. He would repeat this through three cigarettes, with 5-minute breaks between each cigarette. The subject would keep the cigarette butts from these sessions in "butt jars" at home, where for 15 minutes each day he would smell and view the jar's contents to revivify the aversive sensations of the sessions. Results at 10.5-month follow-up showed abstinence rates of 23% for the gum only group, 30% for the training only group, and an impressive 50% for the combination group.

Conclusions on aversion therapies research. A summary of the aversion therapies can be found in Table 8. The literature regarding aversion therapies is mixed, with some success rates reported in the 25% range and others closer to 50%. Some psychologists may question the ethics of such a treatment, particularly when they routinely lead to patients vomiting and losing consciousness. Regardless of one's point of view, the patient should be fully informed beforehand of the procedure and of its potential side effects as a matter of informed consent. Second, it seems

less ethical to use a non-aversive technique that is not as effective. This is so because the health implications of continued smoking are clearly more aversive than the side effects of such a treatment program.

Table 8
Abstinence Rates of Aversion Therapies

Treatment	Investigators	Interval	
		6 months	12 months
rapid smoking	Corty & McFall	19%	--
rapid smoking/puffing	Erickson et al.	58%	53%
STOP	Lando	--	46%
taste satiation	Walker & Franzini	28%	--
focused smoking	Walker & Franzini	19%	--
smokhldg+grad.rdctn.	Lando & McGovern	51%	44%
smokhldg+NG	Killen et al.	--	23%
smokhldg+NG+behav.	Killen et al.	--	50%

Contingent Reinforcement

Contingent reinforcement is based on operant conditioning theory. A positive reinforcer is delivered each time the subject makes a specific response. This specific response is in terms of decreased smoking behavior, usually defined by the amount of carbon monoxide (CO) in the subject's breath. Typically the positive reinforcer is available on a fixed interval schedule, i.e., at each daily or weekly check-up.

Monetary reinforcement, a form of contingent reinforcement, is commonly carried out in one of two ways. One involves the money source being the researcher or therapist; the other utilizes deposit contracts, wherein the

source of money for the treatment is the subject or patient. In both variations money is given to the subject for reaching target smoking levels.

The type of monetary reinforcement that involves the use of deposit contracts was tested by Paxton (1983). He conducted three experiments. In the first experiment, involving 109 subjects, he compared 2-month and 4-month contracts; no significant difference in effectiveness of reduction in smoking behavior was observed. In the second experiment, involving 50 subjects, Paxton compared an equal intervals reinforcement schedule with a reinforcement thinning procedure that involved sequentially greater amounts of time between reinforcer availability. Again, no significant difference in abstinence rate was found between treatments. In the third experiment a cumulative deposit technique was used. This involved having subjects create the deposit in four weekly installments, in contrast to depositing the entire amount at once. Results in terms of abstinence rates showed no significant differences among the four groups. Cessation rates for all treatments at 12-month follow-up ranged from 27% to 39%, and they averaged 30%.

Cognitive-Behavioral Skills Training

Curry, Marlatt, Gordon and Baer (1988) compared two cognitive-behavioral skills training interventions. Both treatments involved relaxation training, social support, and the practice of alternative behaviors. In addition, the first condition included focused smoking, health education,

and a contingency contract wherein a subject who smoked following his cessation date was required to send a $15 check to an organization he personally disliked. Unique features of the second condition were role playing, cognitive restructuring, and the identification of high-risk behaviors. These two main treatment conditions were each subdivided into group and self-help formats. Abstinence was monitored through self-report measures; in addition, reports of abstinence 12 months following treatment were subjected to chemical verification using saliva thiocyanate analysis. (Four of the thirty-nine subjects, or 10%, who reported abstinence were re-classified as non-abstinent by the thiocyanate test.) Results showed no significant differences in 12-month cessation rates among the four conditions. Of the 139 subjects who began treatment, 35 (25%) were abstinent one year later.

Decker and Evans (1989) compared a cognitive-behavioral skills training technique to another intervention. Forty-three subjects received the former treatment, which was delivered in five weekly meetings. Subjects met in groups of 8 to 10 members. Treatment consisted of many elements: information on the health risks and economic costs of smoking; forms for monitoring "high urge-to-smoke situations and feelings"; behavior-modification style instruction on nicotine fading; contractual setting of a quit date; and description of methods for coping with withdrawal, including relaxation techniques and diet control. Subjects were

contacted by phone 12 months after the treatment. At that time those subjects reporting abstinence were subsequently verified by breath carbon monoxide analysis, with 10 ppm as the cut-off point. The abstinence rate was 37%. Abstinence was defined as not returning to regular smoking at any time during the 12-month period.

These two studies, published in 1988 and 1989, may signal a new development in smoking cessation approaches (or at least smoking cessation research). They combine a broad band and large number of techniques, address both physiological and psychological withdrawal symptoms, and employ multiple measures in assessing abstinence. This search for the right "combination" of techniques may prove to be very fruitful.

Discussion

Table 9 displays the abstinence rates of all the treatments reported in this review. The rates were obtained by first determining the total number of abstinent subjects from all studies that used that particular treatment, and then dividing that sum into the total number of subjects who received that treatment. For instance, seven studies reported 12-month abstinence rates from nicotine gum treatment. The total number of subjects abstinent in those seven studies was 128, and the total number of subjects who participated in those seven studies was 492. The abstinence

rate reported in Table 9 is therefore 128 divided by 492, which is .26.

Table 9
Abstinence Rates of All Treatments in This Review

Treatment	N[a]	n[b]	6-mo.	12-mo.
Acupuncture	0/140	0/1	--	16%
Anticholinergics	0/500	0/1	--	39%
Nicotine Gum (NG)	246/492	4/7	34%	26%
NG psyc/phys[c]	644/474	11/8	30%	25%
NG phys/phys	0/44	0/2	--	36%
Gradual Reduction (GR)	104/80	6/4	31%	23%
GR phys/phys	130/130	1/1	51%	44%
GR psyc/phys	156/118	5/3	32%	28%
REST	98/98	2/2	32%	20%
REST psyc/psyc	15/45	1/2	73%	49%
Hypnosis	189/123	4/3	25%	31%
Hypnosis psyc/psyc	27/30	1/1	19%	47%
Hypnosis psyc/phys	63/0	1/0	19%	--
Aversion Therapies	104/43	4/2	29%	49%
AT phys/phys	130/127	1/3	51%	33%
Contingent Reinforcement	0/159	0/1	--	30%
Cog. Beh. Skills Training	0/182	0/2	--	28%

[a]Total number of subjects. First number is for 6-month rate; second number is for 12-month rate.
[b]Number of studies. First number is for 6-month rate; second number is for 12-month rate.
[c]Denotes the study utilized a combination of treatments. "Psyc/phys" means a psychological treatment and a physiological treatment were combined; "phys/phys" means two physiological treatments were combined.

All treatments proved to be more effective than no treatment. (Recall Table 1's no-treatment rates of 9% and 10%.) There are several rates in Table 9 that are notably

higher than most others, but these are based on single studies. These include anticholinergics, gradual reduction "phys/phys," hypnosis "psyc/psyc" (12-month rate), and aversion therapies "phys/phys" (6-month rate). Removing these single study results from the table, since lack of replication makes such exceptional rates less compelling, we find that most of the studies' success rates fall between 20% and 30%. After a brief note on anticholinergics, those several interventions which posted abstinence rates in excess of 30% will be discussed in turn.

Anticholinergics boast an impressive success rate, but the high rate is based on single study (Bachynsky, 1986). It is true that the sample size of 500 in Bachynsky's study is compelling; however, a replication study obtaining a similarly high abstinence rate is necessary for drawing firmer conclusions regarding the efficacy of anticholinergics for smoking cessation. In addition, this proposed replication study needs also to include a control condition that matches the anticholinergics' aversive qualities.

The intervention with the best rates involves REST in combination with another psychological treatment. However, this REST combination's impressive statistics are based on studies with small numbers of subjects: the "73%" and "49%" rates were generated from a total of 29 subjects.

The various aversion therapies' 12-month rate of 49% would be more convincing were it not for twice the number of

aversion therapy studies posting a much lower 6-month rate. Since no abstinence rates within an individual study increased from the sixth to the twelfth months following treatment, it is unlikely that these data in Table 9 reflect such a property of aversion therapies. Rather, all six studies taken together suggest that the effectiveness of aversion therapy alone is about the same as most others reviewed.

Aversion therapies in combination with other physiological interventions appear to be more effective than most of the others reviewed, although not markedly so. Posting a similar effectiveness is nicotine gum in combination with other physiological treatments. Both the aversion therapies combination and the nicotine gum combination have through multiple studies demonstrated rates that are above the average, so they are here regarded as the best of the current clinically-based smoking cessation interventions.

The prepondarance of rates in both the 6-month and 12-month categories cover rather small ranges. And these ranges are not only small, they also overlap one another considerably. Is there a significant difference between them? Of the 1,583 subjects included in all the 6-month follow-up studies in this review, 481 (30%) were abstinent. This is almost no different from the 12-month rate of 29% (677 of 2,317 subjects)--an unexpected finding. This may be due in part to the fact that the two sets of studies from

which the 6-month and 12-month rates derive overlap but are not identical: 22 treatment groups in this review were assessed at both intervals. The average (median) drop in abstinence rate among these groups was 7%, with a range of 0%-20%.

Another consideration is whether combination treatments were more effective than techniques used in isolation. The information in Table 9 above suggests that treatments that combined physiological and psychological techniques were no more effective than those treatments that did not. In fact, the only "combination" treatments that consistently outperformed their constituent "single" treatments involved REST (which is questionable due to the small number of subjects) and nicotine gum (which appears defensible). This latter effective combination involved two similarly-oriented interventions, both being physiological.

Physiological interventions and psychological interventions fared equally well, as Table 10 shows. This table was derived in a manner similar to Table 9. (The sum of all N's in Table 9 exceeds the number of subjects listed in Table 10 because several studies were included in two Treatment categories in Table 9.)

In conclusion, then, the two best interventions in this literature review are (a) nicotine gum in combination with other physiologically-oriented techniques, and (b) aversion therapies in combination with other physiologically-oriented techniques. Two interventions hold promise but await

replication studies for substantiation: anticholinergics; and REST in combination with other psychologically-oriented techniques, especially hypnosis.

Table 10

Comparison of Psychological and Physiological Interventions Across All Studies in This Review

	No. subjects	No. abstinent	
Intervention Type	6 mos./12 mos.	6 months	12 months
Physiological	1,087/1,826	344(32%)	525(29%)
Psychological	496/491	137(28%)	152(31%)

Although numerous combinations of treatments have been attempted in the last 8 years, many more have not. Two combinations that have a reasonable appeal are nicotine gum plus gradual reduction and contingent reinforcement plus an aversion therapy. The first combination would continue to supply the client with nicotine while gradually reducing the psychological, social, and aesthetic attractions of cigarettes. Relapse might be expected to be greatly reduced through such an approach. The second phase, implemented around 6 months after the person has completely quit the

cigarettes, would involve gradual reduction from the nicotine gum.

The second combination, contingent reinforcement plus an aversion therapy, would reward abstinence while punishing (through memory) thoughts of breaking abstinence. Following these suggestions one step further, an intervention that thoughtfully integrated all four of these treatments--nicotine gum, gradual reduction, contingent reinforcement, and aversion--holds promise for being the most efficacious of all.

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